

REMARKS

Claim 14 was added. Therefore, claims 3 - 8 and 10 - 14 are pending in the instant application. The objections and rejections in the Office Action are respectfully traversed below

The Prior Art Rejections:

Claims 3, 4 and 10-13 were rejected under 35 U.S.C. § 103 over applicant's Admitted Prior Art (APA) in view of **Imaizumi et al.** (USP 5,326,717). Claims 5-8 were rejected under 35 U.S.C. § 103 over the APA, **Imaizumi**, and further in view of **Kirchner et al.** (USP 4,843,450).

It is submitted that the cited art does not teach or suggest all the features recited in the present claimed invention. For instance, independent claim 10 recites "an intermediate layer including a TiO₂ layer formed between said Ti layer and said compound semiconductor layer." This feature is not taught or suggested in the cited Prior Art, either alone or in combination. By providing TiO₂ intermediate layer between the Ti layer and the compound semiconductor layer, variations in threshold voltage (that would have been caused by diffusion of Ti atoms into the compound semiconductor layer) is effectively suppressed.

The Examiner alleged that the teachings of **Imaizumi** for providing a thin metal oxide layer between the Schottky gate electrode and the III/IV semiconductor layer substrate could have been employed at the time of the invention by the skilled artisan to the metal gate/semiconductor interface in a device depicted in Figure 1 of the present application. The Examiner asserted that the motivation to do so was "for the purpose of reducing the leakage current and increasing the breakdown voltage as taught by **Imaizumi** (e.g. abstract)." This is incorrect.

Upon a careful re-review of **Imaizumi**, it is noted that the metal oxide layer of **Imaizumi** is provided for suppressing formation of dangling bonds caused by stress. On the other hand, no such problem is addressed by the **APA** or by the present invention. One object of the present invention for using the TiO_2 film is to eliminate the variation of threshold voltage caused by penetration of Ti atoms into the channel region.

There is no teaching or suggestion in **Imaizumi** to select its teaching regarding the provision of the thin metal oxide layer for combination and use in the **APA** device shown in Figure 1 of the present application for either the purpose stated in **Imaizumi** (suppressing formation of dangling bonds caused by stress) nor for the purpose in the present application for the claimed intermediate layer to suppress the threshold voltage changes caused by the diffusion of Ti atoms. Basically, the Examiner's piece-meal selection of the disparate structures and objectives in **Imaizumi** for unsubstantiated combination with Figure 1 of the present application is a classic case of impermissible hindsight, using the present claimed invention as a blueprint.

At item 4b on page 4-5 of the Office Action, the Examiner responded to the applicant's prior arguments with regard to the motivation to combine with **Imaizumi**. The Examiner stated that "the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the Prior Art cannot be the basis for patentability when the differences would otherwise be obvious." This is incorrect.

The provision of a thin metal oxide layer in the teachings of **Imaizumi** does not naturally result in the present claimed structure having an intermediate layer of TiO_2 formed between the Ti

layer and the compound semiconductor layer in the present claimed combination recited in independent claim 10. Moreover, the advantage recognized by the applicant in discovering the relationship described in Figure 2 of the present application as well as the resulting suppression of threshold variation described in Figure 6 of the present application do not naturally flow from the teachings or suggestions of **Imaizumi**.

As explained above, there is no motivation to modify Figure 1 of the present application with the teachings of **Imaizumi** and the advantages of the present claimed invention do not flow naturally from the teachings or suggestions of **Imaizumi**. The present application may not be used as a blueprint for picking and choosing known components to achieve the present claimed combination without the requisite showing of motivation to combine in the manner claimed. Therefore, the prior art rejections should be withdrawn.

New Claim 14:

New claim 14 was added by this Amendment. Claim 14 recites further features which distinguish over the cited prior art. With regard to the object of **Imaizumi** of suppressing formation of dangling bonds, the metal oxide layer of **Imaizumi** should have a thickness of 1 molecular layer or less (*see, e.g.*, column 2, line 42 of **Imaizumi**). Further, **Imaizumi** discloses that dangling bond formations would be created at the interface when the thickness of the metal oxide has exceeded 10 molecular layers. Contrary to **Imaizumi**, the present invention uses the thickness of about 4nm (40Å) for the TiO₂ film (*see, e.g.*, page 8, line 3 of the present specification). Such thickness, as

recited in claim 14, was chosen so as to allow flowing of tunneling current while simultaneously avoiding pinhole formation. In view of the object of the metal oxide film of **Imaizumi**, there is no reasonable motivation for a person skilled in the art to combine the teachings of **Imaizumi** with the **APA**, setting the thickness of the TiO₂ film to about 4nm. For at least these reasons, new claim 14 patentably distinguishes over the prior art, either alone or in combination.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

ARMSTRONG, WESTERMAN & HATTORI, LLP



John P. Kong
Attorney for Applicant
Reg. No. 40,054

JPK/kal
Atty. Docket No. 001701
Suite 1000
1725 K Street, N.W.
Washington, D.C. 20006
(202) 659-2930



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